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## Mangrove Ecotourism Information System Based on Digital Book and Online Reservations

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# Mangrove Ecotourism Information System Based on Digital Book and Online Reservations

**Abstract**— Bali's tourism sector has faced serious challenges since the pandemic, with Bali's economic growth rate of -12.28% in the third quarter of 2020. Kampoeng Kepiting Mangrove Ecotourism located in Tuban, Kuta Badung district, Bali province is one of the tourism sectors which suffered a heavy impact. Before the pandemic, ecotourism visitors increased however during the pandemic, the number of visits decreased significantly. This study aims to develop a mangrove ecotourism information system, based on digital books and online reservations. The ecotourism digital book outlines the catalog of tour packages offered along with information on the mangrove tour packages for conservation and education. Based on the information from a digital book, potential visitors can use an online reservation application to make a reservation for tour packages and do payment by bank transfer. Once the payment process is done, visitors get digital vouchers to use the tour packages they have been reserved. The E-Voucher was used to visit the ecotourism of Kampoeng Kepiting. The development of a mangrove information system is expected to support the promotion of ecotourism in the recovery of ecotourism during the COVID-19 pandemic.

**Keywords**- Kampoeng Kepiting, Ecotourism, Digital Book, Online Reservation

## I. INTRODUCTION

The tourism sector in Bali is experiencing a fairly heavy impact due to the prolonged pandemic, which affects the economic level of the community. There has been a decline in Bali's economic growth rate of -12.28% since 2020 [1]. In the context of the economic recovery of the Bali tourism sector, a new strategy breakthrough is needed, tourists prioritize cleanliness, health, and practical ways, so a strategy is needed to develop ecotourism with digital-based modeling. One of the affected tourism sectors is the Kampoeng Kepiting mangrove ecotourism, which has been operating since 2008, managed by Wanasari fishermen in Tuban Village, Bali Indonesia.

Mangrove ecotourism areas themselves have several sub-activities, namely crab cultivation, mangrove education, mangrove processing, and marketing groups, community groups overseeing mangroves, cultural arts activities, water tourism, and culinary tourism [5]. Since before the pandemic until 2019, tourist visits have increased, but since the pandemic, until now mangrove ecotourism has stopped temporarily

The problems encountered are the absence of tourists and visitors who visit mangrove ecotourism, which is usually crowded with visitors, currently quiet/no visitors. This impacts the livelihoods of the Tuban Wanasari fisherman group, which partly depends on mangrove ecotourism for their economy. The current condition of mangrove ecotourism in its activities is

still applying the manual method in tourism management. This study develops a mangrove ecotourism information system in the form of digital book applications and online reservations that support ecotourism promotion. Digital books are accessed online to describe the types and packages of mangrove tours. The online reservation application helps prospective visitors make their reservations on mangrove tour packages, after the payment process the system issues digital tour package vouchers. Ecotourism is the face of the future of tourism from the development of new lifestyles and awareness of the people who are increasingly caring about the natural environment. The industry 4.0 era affects various sectors, including the tourism sector. For example, now travelers simply rely on digital platforms to search, order, and even make payments. Tourism 4.0 is also known as Millennial Tourism. Currently, the growing traveler portfolio is the millennial generation where 50 percent of inbound travelers are millennials [7]. This is reinforced by data from Deloitte Consulting Southeast Asia 2019 which states that 40 percent of global tour and booking activity is done online [8]. This ecotourism can build the economy of fishermen, the availability of jobs, changes in livelihoods, mindset change, and ability development.

## II. RESEARCH METHODS

### A. Stage of Research

The research was conducted in mangrove ecotourism Kampoeng Kepiting Tuban, Badung Bali. The methods are carried out by digital books, and online reservations. Digital books could be accessed online which contains information and photos about tourism objects such as mangrove forest visits, mangrove nurseries, seed planting activities, mangrove forest conservation, culinary tours, and other activities. The digital online reservation is used by the visitor to reserve the ecotourism package by choosing the tour package provided. The stage of the research is shown in Figure 1.

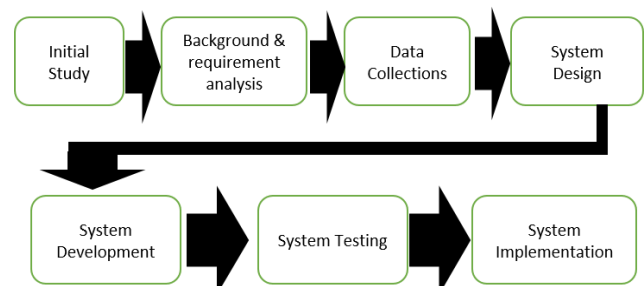


Figure 1. Stage of the Research

### B. System Overview

A system overview is shown in Figure 2, starting with potential visitors wanting to know about ecotourism products and services through the digital promotion book application. Prospective visitors get a complete picture of the products and services provided by the tourism object to be visited. Prospective visitors can at the same time purchase by transfer of funds for the selected tour package. Visitors can first register personal data which then gets a Visitor ID. When a prospective visitor visits an ecotourism object, the visitor shows vouchers that have been purchased previously, in the form of a digital QR Code that can be used to pick up a tour package, by showing the voucher are then scanned by the officer, which indicates the visitor has taken the tour package.

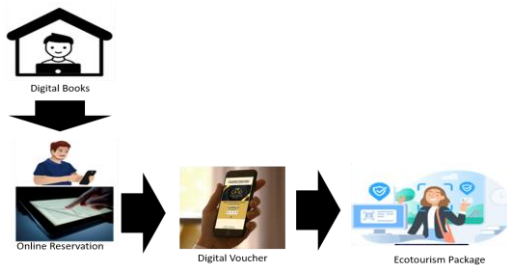


Figure 2. System Overview

The preliminary study activity aims to plan and coordinate activities to be carried out related to the Kampoeng Kepiting ecotourism digitalization model. The data collection activity by reviewing the research location and collecting data related to the latest ecotourism conditions as shown in Figure 3.



Figure 3. Preliminary Study and Interview

The system development method in this study uses the Prototyping development method, a systematic software development method, that has several stages including preliminary study, requirement analysis, software design, create prototyping, customer evaluation, software update, system development, software testing, and software implementation. The prototyping model is shown in Figure 4.

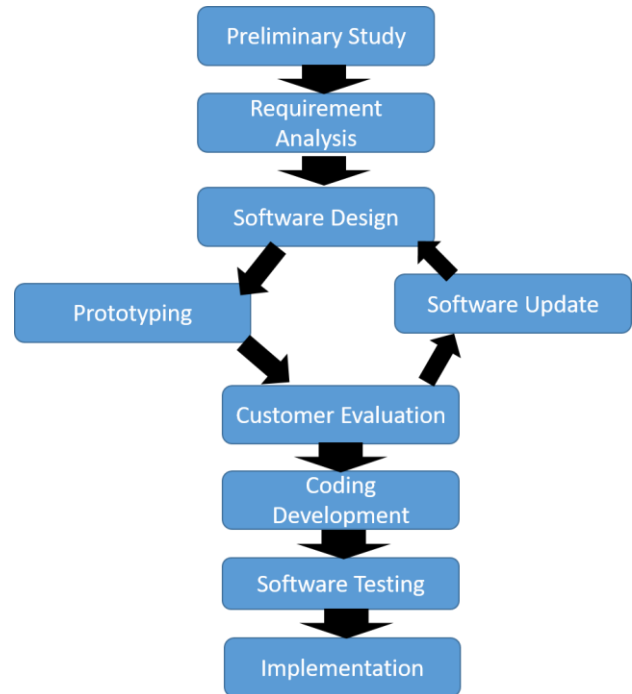


Figure 4. Prototyping Model Software Development

### III. RESULTS AND DISCUSSIONS

The database design in the development of a relational-based ecotourism system in the form of a physical data model is shown in Figure 5.

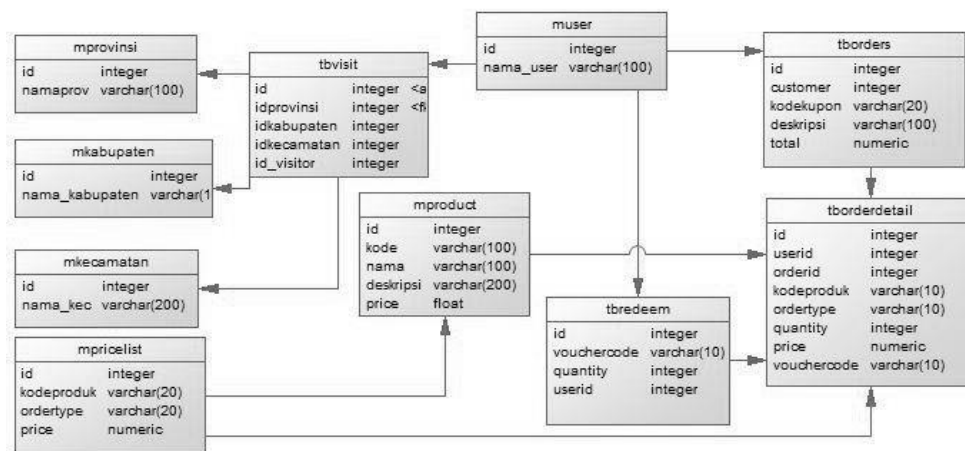


Figure 5. Physical Data Model Ecotourism Database

Visitor data and users are stored in the muser table, tour package product data is stored in the mproduct table, visitor reservation data is stored in the tborders and tborderdetail tables. Meanwhile, voucher usage data (redeem) is stored in the tbreedem table. Meanwhile, the price of the tour package is stored in the mpricelist table. All of these tables are related to each other as the basis for the concept of database normalization.

Data Flow Diagram is a diagram that describes the flow of data from a process that is often referred to as an information system. Data flow diagrams also provide information about the inputs and outputs of each entity and the process itself. Figure 6 shows a context diagram of a mangrove ecotourism information system

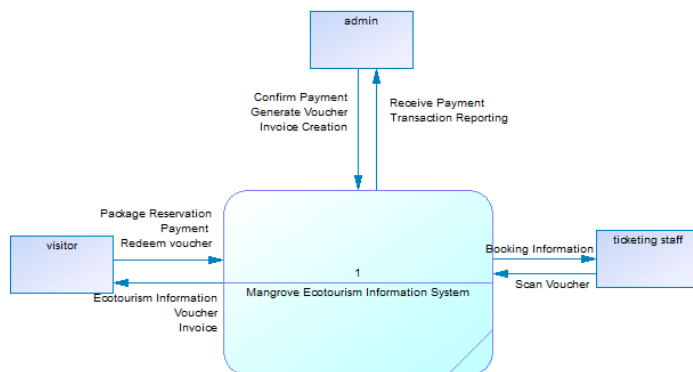


Figure 6. Context Diagram

The context diagram design is shown in Figure 6, which are 3 entities involved, the visitor entity, the admin entity, and the ticketing staff.

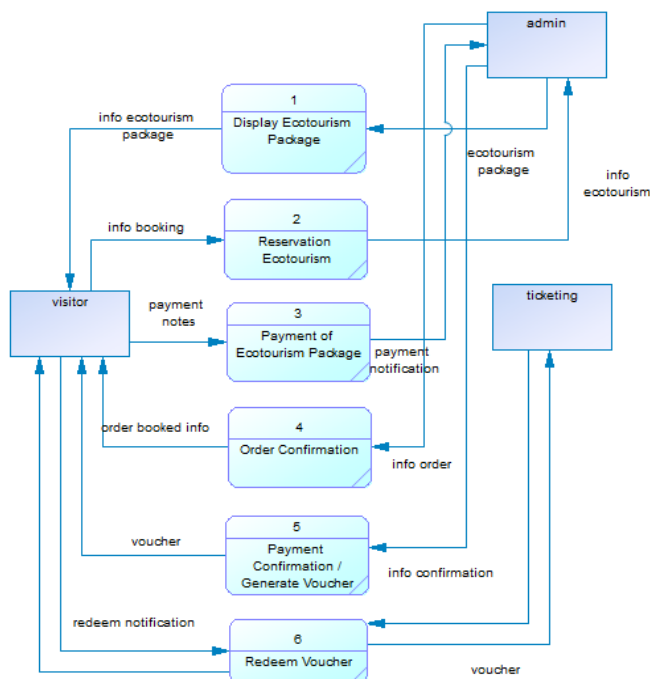


Figure 7. Design of Data Flow Diagram Level 1

The level 1 data flow diagram design is described in Figure 7, which is a description of the context diagram with a description of several processes in it, with the number of entities associated with the context diagram design.

The digital book application can help to promote Kampoen Kepiting tour packages online. The application displays the available tour packages. The digital book could be seen in Figure 8.

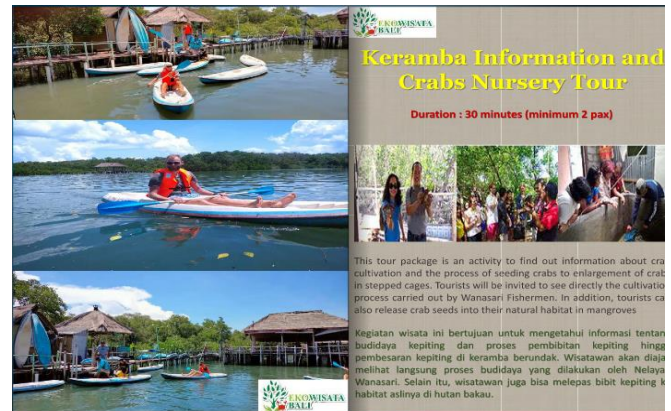


Figure 8. Digital Books for Crabs Nursery Tour

Crab Nursery Tour display crab nursery tour packages where tourists are invited to go around to see the crab cages in the location along with how to breed crabs.



Figure 9. Digital Books for Making Mangrove Seed Tour

Figure 9 shows the activity of making mangrove seed tours where tourists are invited to learn how to make mangrove seedlings and sow seeds in coastal water areas before planting. Making seeds, planting in polybags, and arranging them in the nursery until they are ready to be planted.

The online reservation application can be used by prospective visitors to make reservations and purchase tour package vouchers before visiting ecotourism locations. This application aims to implement digitalization in booking tour packages by using advance payments and implementing a voucher system, thereby reducing direct contact with visitors and ecotourism organizers in the payment process. The



appearance of the tour package reservation application begins with the user logging in or creating a new account to be able to login into the application as shown in Figure 10.

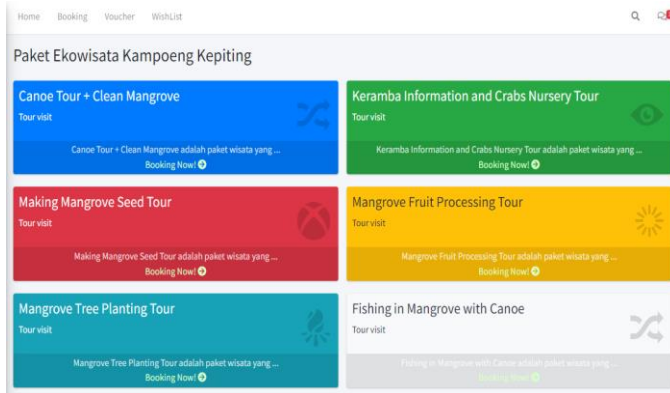


Figure 10. Online Reservation Ecotourism Packages

The online reservation below displays the tour packages offered in Kampoeng Kepiting. There are booking menus, voucher menus, wish list menus, price list menus that can be used by tourists as a reference for making tour package reservations, as shown in Figure 10.

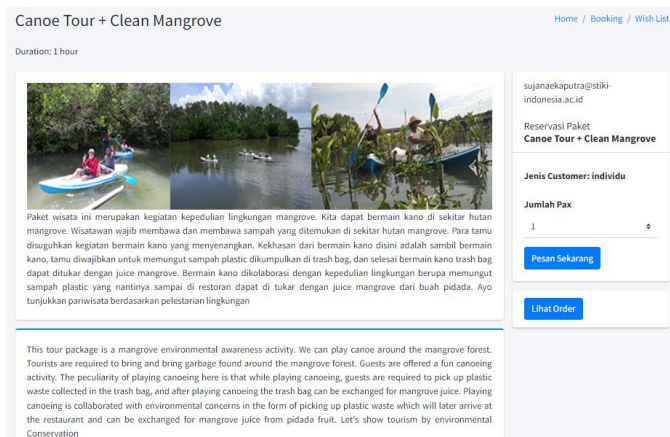


Figure 11. Canoe Tour and Clean Mangrove Packages

Figure 11 describe canoe tour and clean mangrove packages. This is a mangrove environmental awareness activity, while visitors play canoe around the mangrove forest and are required to bring garbage found around the mangrove forest, and once landing the visitor is served fresh mangrove juice.

Booking Paket Wisata Summary						
Paket Wisata Yang Di Check Out						
#	Booking Code	Nama Paket	Jenis	#Pax	Price (Rp)	Amount (Rp)
1	PSB49SU	Mangrove Tree Planting Tour	individu	5	150000.00	750000
2	WAT1L2W2	Fishing in Mangrove with Traditional Boat	individu	5	750000.00	3750000
3	WAT1L2W2	Mangrove Fruit Processing Tour	individu	10	300000.00	3000000
4	WAT1L2W2	Canoe Tour + Clean Mangrove	individu	2	250000.00	500000

Figure 12. Booking List Ecotourism Package

Figure 12 describes the booking list of the package consisting of package name, visitor type, total pax, and package price. The bottom displays the total cost of the booking order. The tour package that has been ordered can then be selected for booking confirmation by pressing the "Check Out" button. Once Check-Out, the system automatically generates a booking code, then displays the summary of the booking order.

		No Rekening: 0107213000 Agus Diana
		No Rekening: 1461629518 Agus Diana
		PayPal Account: cybers_romeo@yahoo.com

#	Booking Code	Customer	Description	Total Payment	Bank Name	Remark
1	PSB49SU	I Gede Sujana Eka Putra	Paket Ekowisata Mangrove	\$ 56	PayPal cybers_romeo@yahoo.com	Voucher Issued
2	WAT1L2W2	I Gede Sujana Eka Putra	Paket Ekowisata Mangrove	Rp. 7,750,000 PayPal \$: 581	Mandiri	Voucher Issued

Figure 13. Payment Methods Package Booked

Figure 13 shows the payment method for the packages booked, where this module contains information about the bank account for payment or use PayPal account. Each package consists of a booking code, description, and total payment. Furthermore, if the payment has been made, the tour package manager can check and confirm the payment that has been made to create a voucher.

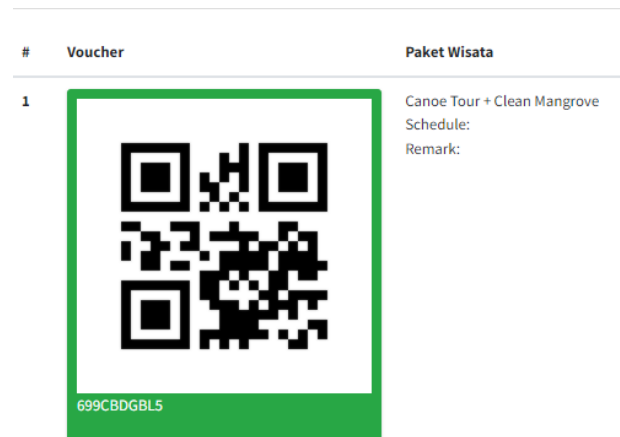


Figure 14. Ecotourism Voucher Package

Figure 14 shows the ecotourism voucher package created by the system automatically after the payment is confirmed by the admin. Furthermore, visitors can use the voucher to enjoy the ecotourism package.

System testing is done by using black-box testing. Black box testing is one of the software testing methods that focuses on the functionality side, especially on application input and output (whether it is in accordance with what is expected or not). The results of testing the digital book application are shown in Table I.

TABLE I. DIGITAL BOOKS APPLICATION TESTING

No	Module Name	Remark
1	Digital Books application	The application describes tour package information properly for each page without errors being found. The website can be accessed on the page: <a href="http://www.kampoengkepiting.com">www.kampoengkepiting.com</a>

TABLE II. ONLINE RESERVATION MANGROVE ECOTOURISM

No	Module Name	Remark
1	Login and register account	The application can validate logins and passwords. The application has successfully logged into the online reservation application with the registered email password
2	Dashboard application	The application can display the details of the tour package after the dashboard is clicked.
3	Booked Now	the application can record the number of pax ordered according to the selected tour package
4	List of Booking Package	the application can display tour packages that have been booked
5	Check out booking	the application can check out orders that have been booked, and enter the payment menu
6	Payment Confirmation	the application can confirm payment, make tour package vouchers, and display tour package vouchers

The implementation model of the mangrove ecotourism system is broadly shown in Table III.

TABLE III. OVERVIEW OF THE SYSTEM IMPLEMENTATION MODEL

No	Module Name	Remark
1	Digital Books	Prospective visitors can view ecotourism tour packages online
2	Ecotourism Package	Prospective visitors register and then view tour packages on the website
3	Reservation Menu	Visitors can make a reservation of tour packages and then the system creates summary orders and provides payment information. Prospective visitors make payments via bank transfer (national) or via PayPal account (international)
4	Payment Confirmation	Admin checks payments and confirms payments. If the payment is done, the payment is confirmed and the system issues a tour package voucher for visitors (QR Code)

#### IV. SUMMARY

The conclusions from this research are as follows:

- A. The digital ecotourism model implemented is in the form of digital book media applications, online reservations / digital vouchers.
- B. Digital book applications and online reservations provide complete information on tour packages and make it easier to book the packages that can be accessed anywhere and anytime.
- C. The system test results show the system runs according to its function and is error-free.

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**Mr. I Gede Sujana Eka Putra** is studying in doctoral program at Udayana University, Bali Indonesia. He graduated with a bachelor's degree in multimedia telecommunications at the Sepuluh Nopember Institute of Technology, Surabaya, and a master's degree in Management of Computer Information Systems at Udayana University. He has more than 18 years of experience working in the field of information technology and he has developed a traceability information system for the fish processing industry and the application called "TraceTales". Sujana is committed to continuing to play an active role in developing and implementing technology to support sustainable fisheries. Currently, he is active in conducting research about developing an information system of fisheries traceability system from upstream (catch), processing into downstream (end customer). His research interest includes the Internet of Things (IoT), Biometrics, Machine Learning, Artificial Neural Network. He has attended 3 national conferences, presented 3 papers, published 4 papers in International Journals and 9 papers in National Journals indexed.